



Sodium

Euvoletic hyponatremia

True hyponatremia and ADH

No urine output with normal water intake



ADH irrelevant

Normal water intake with decreased urine output



ADH dependent*

Compulsive water drinking with maximal but inadequate urine output



ADH suppressed

True hyponatremia and ADH

Normal water intake with decreased urine output



ADH dependent*



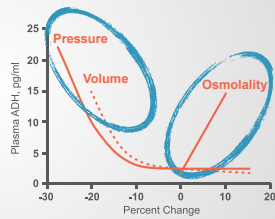
Two physiologic stimuli for ADH release

Increased serum osmolality

Decreased perfusion

→ Volume depletion

→ Hypotension



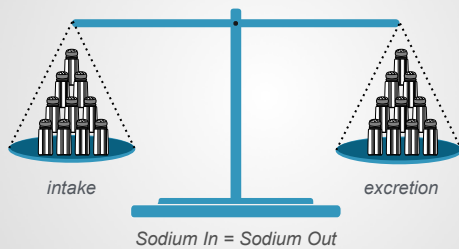
What if there are no physiologic stimuli for ADH release?

Euvolemic hyponatremia



People live in sodium balance
The kidney excretes exactly as much sodium as the body absorbs.

Euvolemic hyponatremia



Determinants of urine volume

$$\text{volume} = \frac{700 \text{ mOsm}}{\text{concentration}}$$

$$580 \text{ mL} = \frac{700 \text{ mOsm}}{1,200 \text{ mOsm/kg H}_2\text{O}}$$

maximal and fixed ADH

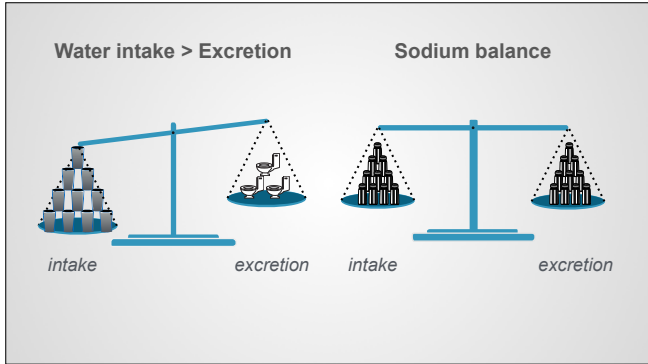
Determinants of urine volume

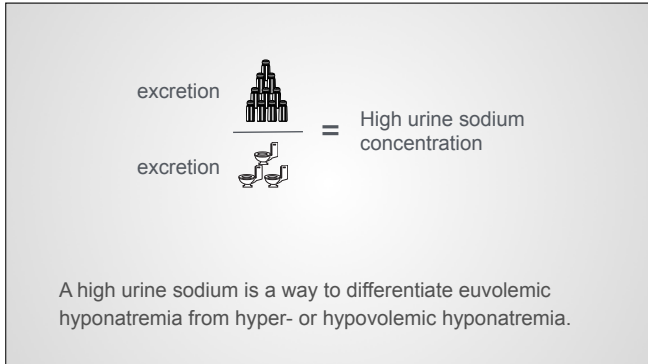
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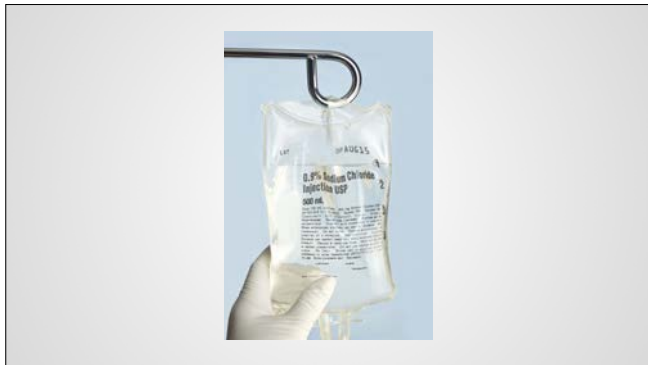
maximal and fixed ADH











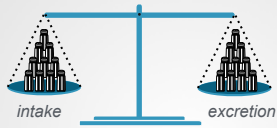
In **hypovolemic hyponatremia**:
sodium improves

In **Tea and Toast syndrome**:
sodium improves

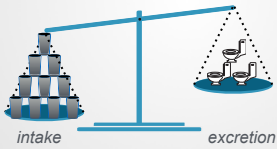
In **hypervolemic hyponatremia**:
sodium does not improve, patient
may deteriorate

In **euvolemic hyponatremia**: sodium
does not improve, and may fall





all of the sodium
is excreted...



... in a small
volume of urine,
so that some of
the water is
retained.

Euvolemic hyponatremia

Hypothyroidism
check TSH

Adrenal insufficiency
Check cortisol

SIADH
low BUN
low uric acid

SIADH *low BUN*
low uric acid

Paraneoplastic

Nausea

Pulmonary disease

TB

Positive pressure ventilation

Pneumonia

CNS disease

Drugs

SSRI

Anti-psychotics

Narcotics

DDAVP

Oxytocin

Sulfonylureas
